UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DONNA K. JOHNSON, JIM S. NAKOS,
JEAN-JACQUES H. PSAUTE and BERNARD A. ROQUE, Jr.

Appeal 2007-2775
Application 10/064,451[1]
Technology Center 1700

Decided: November 29, 2007

Before FRED E. MCKELVEY, *Senior Administrative Patent Judge,* and RICHARD E. SCHAFER, and SALLY C. MEDLEY, *Administrative Patent Judges*.

MEDLEY, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] Application for patent filed 16 July 2002. The real party in interest is International Business Machines Corp.

A. Statement of the Case

This is an appeal under 35 U.S.C. § 134 from the Examiner's Non-Final Rejection[2] of claims 1-7, 9-15 and 17-18[3]. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Hoshina	US 5,785,764	Jul. 28, 1998
Zhao	US 5,968,379	Oct. 19, 1999
Honma	US 6,596,086	Jul. 22, 2003

Claims 1-7, 9-15 and 17-18 stand rejected as failing to comply with the written description requirement 35 U.S.C. § 112, first paragraph (Non-Final Rejection pp. 2-3 and Examiner's Ans. pp. 3-4).

Claims 1-7, 9-15 and 17-18 stand rejected as being unpatentable under 35 U.S.C. § 103(a) over Honma in view of Hoshina (Non-Final Rejection pp. 3-4 and Examiner's Ans. p. 5).

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[2] Prosecution was reopened after the filing of the first Appeal Brief on 31 March 2005. Applicants reinstated the Appeal following the Non-Final Rejection mailed 25 May 2005.

[3] Claims 8, 16 and 19 have been cancelled (Amendment entered 22 October 2004 and Amendment entered 31 January 2005). Claim 17 was objected to (Examiner's Ans. p. 3). Claim objections are not subject to appeal under 35 U.S.C. § 134. The Examiner and the Board have treated claim 17 as if it was dependent on claim 15.

Claims 1-7, 9-15 and 17-18 stand rejected as being unpatentable under 35 U.S.C. § 103(a) over Zhao in view of Hoshina (Non-Final Rejection pp. 4-5 and Examiner's Ans. p. 6).

BACKGROUND

The invention is related to an apparatus for holding a semiconductor wafer **120** during wafer processing. The apparatus includes a pocket **125** for holding the wafer and a plurality of projections **115** extending radially inward from the inner edge of the pocket that make contact with the wafer. The projections have an inclined beveled edge that produces an acute angle **201** (**figs. 2-3**) between the lower surface of the pocket and the beveled edge. (**figs. 1-3** and Spec. ¶¶ 18-21).

B. Issues

The first issue is whether Applicants have shown that the Examiner erred in determining that claims 1-7, 9-15 and 17-18 fail to comply with the written description requirement of 35 U.S.C. § 112, first paragraph?

For the reasons that follow, Applicants have sufficiently shown that the Examiner erred in determining that claims 1-7, 9-15 and 17-18 fail to comply with the written description requirement of 35 U.S.C. § 112, first paragraph.

The second issue is whether Applicants have shown that the Examiner erred in determining that claims 1-7, 9-15 and 17-18 are unpatentable under 35 U.S.C. § 103(a) over Honma in view of Hoshina?

For the reasons that follow, Applicants have sufficiently shown that the Examiner erred in determining that claims 1-7, 9-15 and 17-18 are unpatentable under 35 U.S.C. § 103(a) over Honma in view of Hoshina.

The third issue is whether Applicants have shown that the Examiner erred in determining that claims 1-7, 9-15 and 17-18 are unpatentable under 35 U.S.C. § 103(a) over Zhao in view of Hoshina?

For the reasons that follow, Applicants have sufficiently shown that the Examiner erred in determining that claims 1-7, 9-15 and 17-18 are unpatentable under 35 U.S.C. § 103(a) over Zhao in view of Hoshina.

C. Findings of Fact ("FF")

The record supports the following finding of facts as well as any other findings of fact set forth in this opinion by at least a preponderance of the evidence.

1.Applicants' claims 1-7, 9-15 and 17-18 are the subject of this appeal.

2.Claims 2-6, 10-14 and 17-18 are dependent on independent claims 1, 7 and 15.

3.Claim 7 is representative and is as follows:

> 7. An apparatus for holding a substrate, said apparatus comprising:
> a pocket adapted to hold said substrate, wherein said pocket comprises an inner edge and a lower surface;
> a plurality of projections extending radially inward from said inner edge;
> and an opening in said lower surface;
> wherein said projections have a beveled edge, and
> wherein an acute angle greater than 80 degrees occurs between said lower surface and said beveled edge.

1. 35 U.S.C. § 112,¶ 1 rejection

4.The Examiner found the Specification does not describe the acute angle to be greater than 80 degrees at the exclusion of an angle of exactly 80 degrees (Non-Final Rejection pp. 3-4 and Examiner's Ans. p. 4).

5.The Examiner found that there is no disclosure and appreciation of any unexpected advantage of an angle greater than 80 degrees but not exactly 80 degrees (Non-Final Rejection p. 4 and Examiner's Ans. p. 4).

6.The Examiner concluded that the amendments to claims 1, 7 and 15, adding the limitation of an acute angle of more than 80 degrees for the beveled edges of the projections, fails to comply with the written description requirement (Non-Final Rejection pp. 3-4 and Examiner's Ans. p. 4).

7.Applicants disclose an angle **200** (**fig. 3**) that is complimentary to the beveled edge as being "generally between 5 and 10 degrees, although the invention is not limited to this specific range of angles, but is applicable to all ranges of appropriate angles, depending upon the specific application being addressed. Therefore, the angle 201 [fig. 3] comprises an acute angle. Thus, the angle between the bottom of the pocket 125 and the linear inclined surface of the projection 115 is less than 90 degrees (e.g., 80-85 degrees)" (Spec. p. 5-6, ¶ 21).

2. 35 U.S.C. § 103(a) rejections

Rejection based on Honma in view of Hoshina

8.The Examiner found that Honma describes a susceptor having a pocket to hold a substrate having an inner edge and a lower surface and an opening

in the lower surface for pins to lift the substrate (**figs. 1, 5a, 5b**; Non-Final Rej. p. 3 and Examiner's Ans. p. 5).

9.The Examiner further found that Honma does not describe a plurality of beveled edge projections extending radially inward from the inner edge (Non-Final Rej. p. 4 and Examiner's Ans. p. 5).

10.The Examiner found that Hoshina describes a susceptor with a pocket to hold a substrate, a plurality of C shaped projections **17** extending radially inwards at an acute angle of 80 degrees (complementary 10 degrees) with respect to the bottom of the pocket (**figs. 1A, 5A**, col. 3, ll. 10-43 and col. 7, ll. 5-15; Non-Final Rej. p. 4 and Examiner's Ans. p. 5).

11.The Examiner concluded that it would have been obvious to one with ordinary skill in the art at the time of the invention to have a plurality of projections in order to hold the substrate in position with a very small area of contact (Non-Final Rej. pp. 4, 5 and Examiner's Ans. pp. 5, 6).

12. The Examiner further concluded that slight variability of the angle being even slightly greater than 80 degrees would be obvious in view of experimental optimization and maintaining close tolerance (Non-Final Rej. p. 4 and Examiner's Ans. p. 5)[4].

Rejection based on Zhao in view of Hoshina

13. The Examiner found that Zhao describes a susceptor having a pocket to hold a substrate having an inner edge and a lower surface **34** and an

[4] The Examiner reached this conclusion only for the rejection of the claims over Honma in view of Hoshina.

opening in the lower surface for pins to lift the substrate (**fig. 2**, col. 11, ll. 1-18, and col. 19, ll. 1-8; Non-Final Rej. p. 4 and Examiner's Ans. p. 6).

14.The Examiner further found that Zhao does not describe a plurality of beveled edge projections extending radially inward from the inner edge (Non-Final Rej. p. 4 and Examiner's Ans. p. 6).

15.The Examiner found that Hoshina describes a susceptor with a pocket to hold a substrate, a plurality of C shaped projections **17** extending radially inwards at an acute angle of 80 degrees (complementary 10 degrees) with respect to the bottom of the pocket (**figs. 1A, 5A**, col. 3, ll. 10-43 and col. 7, ll. 5-15; Non-Final Rej. p. 4 and Examiner's Ans. p. 5).

16.The Examiner concluded that it would have been obvious to one with ordinary skill in the art at the time of the invention to have a plurality of projections in order to hold the substrate in position with a very small area of contact (Non-Final Rej. pp. 4, 5 and Examiner's Ans. pp. 5, 6).

Hoshina reference

17.Hoshina teaches that if the height $\mathbf{H_1}$ of the protuberance 6 is too low or angle $\mathbf{\Theta_1}$ is larger than 80 degrees, then, when forming a thick thin film, the amount of the source material gas which flows around the contact area between the wafer **3** and the side wall **4** of the pocket **2** and its vicinity increases and cross bridges grow due to deposition of silicon, resulting in adhesion which causes cracks or breakage when taking out the wafer **3** from the pocket **2** after the gas phase growth (**figs. 1-2** and col. 5, ll. 23-31).

18.Hoshina describes prior art devices for thin film gas phase growth on a wafer that are designed to prevent cracks and breakage due to crossbridge

formation and adhesion of the wafer to the susceptor (col. 2, l. 20-col. 3, l. 30).

19.Hoshina also describes that cracks and breakage due to wafer adhesion cannot always be prevented during the gas phase growth of thin films (col. 2, ll. 31-33).

D. Principles of Law

1. 35 U.S.C. § 112, first paragraph rejection

"The function of the description requirement is to ensure that the inventor had possession, as of the filing date of the application relied on, of the specific subject matter later claimed by him; how the specification accomplishes this is not material." *In re Wertheim*, 541 F.2d 257, 262 (CCPA 1976).

What is required is

> an analysis of each case on its facts to determine whether an application conveys to those skilled in the art the information that the applicant invented the subject matter of the claims. In other words, we must decide whether the invention appellants seek to protect by their claims is part of the invention that appellants have described *as theirs* in the specification. That what appellants claim as patentable to them is *less* than what they describe as their invention is not conclusive if their specification also reasonably describes that which they do claim.

Id. at 263 (emphasis in original).

2. 35 U.S.C. § 103(a) rejections

> A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. The degree of teaching away will of course depend on the particular facts; in general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant.

In re Gurley, 27 F.3d 551, 553 (Fed. Cir. 1994).

A "claimed invention is rendered prima facie obvious by the teachings of a prior art reference that discloses a range that touches the range recited in the claim." *In re Geisler*, 116 F.3d 1465, 1469 (Fed. Cir. 1997) (citing *In re Malagari,* 499 F.2d 1297, 1303 (CCPA 1974)). "[A] prima facie case of obviousness can be rebutted if the applicant . . . can show 'that the art in any material respect taught away' from the claimed invention." *Id.* (quoting *Malagari).*

E. Analysis

1. 35 U.S.C. § 112, first paragraph rejection

Claims 1, 7 and 15 each recite the limitation "wherein an acute angle greater than 80 degrees occurs between" the lower surface of the pocket and the projections' beveled edge. The Examiner found that the Specification does not describe the acute angle to be greater than 80 degrees at the exclusion of an angle of exactly 80 degrees (FF[5] 4). The Examiner found that there is no disclosure and appreciation of any unexpected advantage of

[5] FF denotes finding of fact.

an angle greater than 80 degrees but not exactly 80 degrees (FF 5). The Examiner concluded that the limitation of an acute angle of more than 80 degrees for the beveled edges of the projections fails to comply with the written description requirement (FF 6).

According to Applicants, 35 U.S.C. § 112, first paragraph does not require a showing of an unexpected advantage (Appeal Br. p. 10, Reply Br. pp. 14-15). Applicants contend that they have specifically provided an appropriate range for the acute angle in their specification and those skilled in the art would understand that they had possession of their invention based on the disclosed range. Specifically, Applicants argue that the claimed range is a specific narrow range within the range described in the Specification, which is permissible, citing *Wertheim*[6] (Reply Br. p. 14).

The Examiner is apparently of the impression that unless there is some described advantage for choosing a particular point or points within a described range, then claiming the particular point or points runs afoul of the written description requirement. We agree with Applicants that 35 U.S.C. § 112, first paragraph does not require an applicant to describe an unexpected advantage in order to claim points or a range of points that lie within a described range. The Examiner has not directed us to any authority that supports the Examiner's understanding of the 35 U.S.C. § 112, first paragraph written description requirement.

Further, we agree with Applicants that the Examiner has erred in rejecting the claims on the basis that the claimed range is narrower than the

[6] 541 F.2d 257 (CCPA 1976).

range described in the Specification. The facts in the instant case are similar to the facts in *Wertheim*[7] where the court found that persons skilled in the art would consider the claimed invention employing a solids content between 35% and 60% to be part of appellants invention when the specification disclosed the broad range of 25% to 60% solids content along with specific embodiments of 36% and 50% solids content. Similar to *Wertheim*, persons skilled in the art would consider the claimed invention of "an acute angle greater than 80 degrees" to be part of the invention of an angle less than 90 degrees where the Specification also describes the specific example of 80-85 degrees (FF 7).

For all these reasons, Applicants have sufficiently demonstrated that the Examiner erred in determining that claims 1-7, 9-15 and 17-18 fail to comply with the written description requirement under 35 U.S.C. § 112, first paragraph.

[7] *Id.* at 264-265.

2. 35 U.S.C. § 103(a) rejections

Rejection based on Honma in view of Hoshina

Applicants apparently do not dispute the Examiner's findings (FFs 8-9) with respect to Honma. Applicants contend, however, that Hoshina fails to describe and actually teaches away from "an acute angle greater than 80 degrees" between a lower surface of the pocket and the projections' beveled edge as claimed in independent claims 1, 7, and 15.

The Examiner found that Hoshina describes a susceptor with a pocket to hold a substrate and a plurality of C shaped projections extending radially inwards at an acute angle of 80 degrees with respect to the bottom of the pocket (FF 10). The Examiner acknowledged that Hoshina does not describe that the projections have an angle greater than 80 degrees, but concluded that the claimed range is close enough, citing MPEP 2144.05 and *Titanium Metals Corp. of America v. Banner*[8] (Examiner's Ans. pp. 6-7). On this basis, the Examiner argued that Applicants' Specification has not provided any guidance to assume that an angle greater than 80 (e.g. 80.1) has different properties than an angle of 80 (Examiner's Ans. p. 7).

Applicants argue that Hoshina teaches away from the claimed invention, since Hoshina suggests his invention would be unworkable if an angle greater than 80 degrees is used (Appeal Br. pp. 14-15, 18 and Reply Br. pp. 17-18, 21-22, 26).

In response, the Examiner contends that Hoshina's described preference for the angle to be not larger than 80 degrees is only for the situation when a

[8] 778 F.2d 775 (Fed. Cir. 1985).

thick film is deposited (Examiner's Ans. p. 7). Applicants correctly point out that Hoshina is directed to "thick thin film" deposition not "thick film" deposition (Reply Br. pp. 17-18). To the extent that the Examiner contends that utilizing an angle not larger than 80 degrees only applies to thick thin film, but would not apply to thin film for example, we are not persuaded. Although Hoshina describes prior art devices for thin film gas phase growth on a wafer that are designed to prevent cracks and breakage due to crossbridge formation and adhesion of the wafer to the susceptor (FF 18), Hoshina recognizes that these prior art devices do not always prevent cracks and breakage (FF 19). Hoshina recognizes that utilizing an angle larger than 80 degrees when forming a thick thin film increases the amount of source material gas which flows around the contact area between the wafer and side wall of the pocket and its vicinity resulting in growth of cross bridges, adhesion and cracks or breakage (FF 17). The Examiner has failed to demonstrate that the same problem does not occur when forming thin films.

Applicants have sufficiently rebutted the Examiner's prima facie case of obviousness, by effectively demonstrating that the Hoshina reference teaches away from the claimed invention. Hoshina teaches that using a projection angle greater than 80 degrees increases cross bridge growth and results in adhesion which causes cracks and breakage when removing the wafer from the pocket (FF 17). Applicants seek to improve film uniformity without errors (Spec. pp. 3-6, ¶¶ 11, 17, 19, 23). Hoshina teaches away from the claimed invention, since if one with ordinary skill were to use an angle greater than 80 degrees for the projections, which Hoshina advises against,

one would not expect to produce the results sought by Applicants – to improve film uniformity without errors.

For all these reasons, Applicants have sufficiently demonstrated that the Examiner erred in determining that claims 1-7, 9-15 and 17-18 are unpatentable under 35 U.S.C. § 103(a) over Honma in view of Hoshina.

Rejection based on Zhao in view of Hoshina

Applicants' arguments with respect to the combined teachings of Zhao in view of Hoshina are the same as those made with respect to the combination of Honma and Hoshina (Appeal Br. pp. 19-20 and Reply Br. pp. 27-28). Specifically, Applicants argue that Hoshina teaches away from making the combination. Therefore, for the same reasons explained above with respect to the rejection over Honma in view of Hoshina, Applicants have sufficiently demonstrated that the Examiner erred in determining that claims 1-7, 9-15 and 17-18 are unpatentable under 35 U.S.C. § 103(a) over Zhao in view of Hoshina.

Decision

Upon consideration of the record, and for the reasons given, the Examiner's rejection of claims 1-7, 9-15 and 17-18 as failing to comply with the written description requirement indefinite of 35 U.S.C. § 112, first paragraph is reversed.

The Examiner's rejection of claims 1-7, 9-15 and 17-18 as unpatentable under 35 U.S.C. § 103(a) over Honma in view of Hoshina is reversed.

The Examiner's rejection of claims 1-7, 9-15 and 17-18 as unpatentable under 35 U.S.C. § 103(a) over Zhao in view of Hoshina is reversed.

REVERSED

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